Effects of Presentation Rate and Divided Attention on Auditory Comprehension in Acquired Childhood Aphasia (Abstract)

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The temporal characteristics of test stimuli are known to influence the audiotory comprehension abilities of some brain-damaged individuals. Several studies have reported improved comprehension for both adult aphasic persons and learning disabled children when test stimuli are presented at rates slower than normal. However, it is not clear why auditory comprehension abilities improve as a function of slowing the rate of presentation. A number of researchers have concluded that the processing systems of aphasic individuals are "slower" than normal and require more time to process incoming messages. Although the suggestion that these individuals have slower than normal processing systems appears intuitively correct, such an explanation provides limited insight into the nature of their slow processing systems. Thus, it is necessary to attempt to specify the particular information processing deficits which result in the need for greater processing time by aphasic individuals.

To address this issue, the present study examined the effects of presentation rate and divided attention on the auditory comprehension abilities of seven children with acquired aphasia associated with a convulsive disorder and of their chronologically age-matched normals. Sentences for comprehension were presented to all subjects under four conditions: I) Primary task alone - presented at normal rate of speech; II) Primary task alone - time expanded 75%; III) Primary task presented at a normal rate of speech, with a secondary task presented simultaneously at a normal rate of speech; IV) Primary task time expanded 75%, with a secondary task presented simultaneously at a normal rate of speech. During the latter two divided attention tasks (Condition III and IV) we were primarily interested in the performance of the aphasic and normal subjects on the secondary task (always presented at a normal rate) when the primary task was presented a) at a normal rate (Condition III) and b) at a time-expanded rate (Condition IV). It was hypothesized that if aphasic children are generally slow in processing all verbal stimuli presented at a normal rate, then performance on the secondary task (always presented at a normal rate) should not improve regardless of the rate at which the primary task is presented.

Results from the normal rate and time-expanded conditions (Conditions I and II) revealed that slowing the rate at which the test sentences were presented significantly increased comprehension performance for this sample of aphasic children. Of primary importance, however, was the nonsignificant difference between mean scores for the aphasic group during the time-expanded condition and mean scores for the normal group when sentences were presented at a normal rate. This finding has not previously been reported in the childhood aphasia literature.

Results from the two divided attention tasks (Conditions III and IV) revealed that for both the aphasic and normal children, slowing the rate at

which the primary sentences were presented (Condition IV) significantly improved performance on the secondary sentences presented at a normal rate. This finding suggests that for both groups, changes in the temporal dimensions of the primary message had a substantial effect on the processing of the secondary sentences presented simultaneously at a normal rate of speech. Analyses of group differences on the secondary task during Conditions III and IV revealed that aphasic and normal subjects' performance were significantly different on the secondary task when the primary task was presented at a normal rate during Condition III. However, the two groups did not perform significantly differently on the secondary task when the primary task was time-expanded during Condition IV. That is, when the primary stimuli were presented at the slower rate, the aphasic subjects performed the secondary task as well as the age-matched normals did.

These data argue against the notion that time expansion of the verbal signal merely offers a generally slow system additional time to process the incoming message. If this were the case, one would not predict an increase in secondary task performance when the primary task was time-expanded, because the secondary task was delivered at a normal rate of speech (which the slow system supposedly has difficulty processing). A more tenable explanation will have to incorporate the fact that additional processing time alone cannot explain these data. These results were discussed with reference to current models of attention allocation which appear to account for the benefits of time-expansion for processing auditory information by aphasic children.